Security container with locking closure and method for locking a closure

The present invention relates to a container which can hold tablets or liquids, for example, for use in the pharmaceutical, chemical and food industries and in particular to a locking arrangement for a container and/or a secondary containment region for a container.

Containers that have child resistant features are now generally available but these containers are typically very difficult for elderly or disabled persons to open. Reference should now be made to US patent No. 5908125 and other patents in the same area of technology. In general, child resistant containers require the user to simultaneously squeeze and turn the closure, or push and turn the closure, in order to release the closure from the container body. However, elderly persons or persons with dexterity problems find that the force required to squeeze or push the closure and simultaneously rotate the closure is too great or that they experience pain in attempting to open the closure. Those suffering from rheumatoid arthritis and osteoarthritis will find that they have to avoid any movement, which involves gripping, twisting or bending of the wrist.

Known child resistant containers comprise a cap locking arrangement whereby the user has to turn a cap and align two dots on the respective outer surfaces of the container and the cap. In this position the cap can be pushed open. However, we have found that after the cap has been placed back on the container the user has to remember to turn the cap again so that the two dots are no longer aligned otherwise the container is more readily opened and is no longer child resistant. Furthermore, we have found that when this type of container is opened, the cap partially obscures the view of the contents of the container. Furthermore, for some tablet pharmaceuticals the patient only has to take half a tablet dose. A further disadvantage of the present containers is that once the tablet has been removed from the container it has to be either stored in a separate location or placed back into the container with the other tablets. In this arrangement the part tablet can be hard to find at a later time.

According to a first aspect of the present invention, there is provided container comprising a hollow body, a closure movable between a closed condition and an open condition, a locking part for securing the closure in the closed condition, the locking part being moveable between a locking position and an unlocked position, and actuator means for moving the locking part from the unlocked position to the locking position as the closure is transferred between the respective conditions.

Preferably, the arrangement is such that as the closure is moved to the open condition and the locking part is in the unlocked position the actuator means moves the locking part to the locked position.

Preferably, the arrangement is such that as the closure is moved to the closed condition and the locking part is in the unlocked position the actuator means moves the locking part to the locked position.

The actuator means helps to ensure that the locking part is in a locking position after the closure has been opened and/or closed.

Preferably, the actuator means automatically moves the locking part as the closure is being opened and/or closed; therefore the child resistant feature is automatically activated when necessary during the opening operation and the closing operation.

The present invention aims to overcome the disadvantages we have found of the prior art containers by providing a locking arrangement for a container that is automatically placed in a locked condition.

Preferably, the closure and the locking part comprise respective cooperating locking elements, the arrangement being such that as the closure is removed from the body to open the container, the actuator means moves one of the locking elements relative to the other locking element.

Preferably, the arrangement of the cooperating locking elements located on the closure and the locking part is such that as the closure is pushed back onto the body to close the container, the actuator means moves one of the locking elements relative to the other locking element.

Preferably, the locking part carries an indicator that must be aligned with an indicator on the hollow body and/or the closure, the arrangement being such that in use the indicators are moved from an aligned position to a misaligned position by the actuator means.

In an alternative embodiment the cooperating locking elements are located on the body and the locking part, the arrangement being such that as the closure is removed from the body to open the container, the actuation means moves one of the locking elements relative to the other locking element.

Preferably, in this alternative embodiment the arrangement of the cooperating locking elements located on the body and the locking part is such that as the closure is pushed back onto the body to close the container, the actuation means moves one of the locking elements relative to the other locking element.

The locking part is preferably an annular locking ring.

Preferably, the actuator means comprises an elongate member disposed on the inside of the closure, and the locking ring comprises a ramp, the ramp being sloped such that as the elongate member makes contact with the ramp and is slid progressively along a surface of the ramp rotation of the locking ring results such that the indicators on the body and/or closure and the locking part are no longer aligned.

Preferably, the arrangement of the elongate member and the ramp is such that as the closure is removed from the body to open the container, the elongate member makes contact with a first surface of the ramp and rotation of the locking ring results such that the indicators on the body and/or closure and the locking part are no longer aligned.

Preferably, the arrangement of the elongate member and the ramp is such that as the closure is placed back onto the body to close the container and the indicators are aligned, the elongate member makes contact with a second surface of the ramp and rotation of the locking ring results such that the indicators on the body and/or closure and the locking part are no longer aligned.

Preferably, the ramp protrudes from a radially inner surface of the locking ring.

Alternatively, the ramp is a channel formed in the wall of locking ring, the central axis of the channel being at an angle from the axis of the ring.

Preferably, the elongate member is a flexible cantilever.

Preferably, the elongate member is hook shaped cantilever, extending from the inside surface of the closure.

The locking part is preferably located between the body and the closure.

The cooperating locking element located on the closure is preferably a lug.

In a first embodiment of the present invention the cooperating locking element located on the locking part is a circumferential flange disposed on the inside surface of the locking part and the lug is formed on the elongate member, the flange being formed with a recessed portion through which the lug can pass during opening and closing of the closure.

The ramp is preferably disposed axially below the circumferential flange and generally inline with the recessed portion of the flange, the arrangement being such that there is a gap between the uppermost part of the ramp and the circumferential flange.

In a second embodiment of the present invention the cooperating locking element located the locking part is a circumferential track attached to the inside surface of the locking part and the lug is formed with a distal head part, the lug extends from an inner surface of the closure, the track being formed with an access hole through which the head of the lug can pass during opening and closing of the closure.

The ramp is preferably disposed axially above the circumferential track.

Preferably, the arrangement of the ramp and the flange is such that upon rotation of the locking part in one direction the lug first passes through the gap and generally aligns with the recess before the elongate member makes contact with the ramp.

Preferably, the body has an outlet, which can be sealed by a sealing element located on the closure.

In an alternative embodiment of the present invention the lug comprises a member formed with a barbed distal end.

According to a second aspect of the present invention, there is provided a method for locking a closure to a container according to the first aspect of the present invention, the method comprising moving a locking part from an unlocked position to a locking position as a closure is transferred between respective conditions.

Preferably, the arrangement is such that as the closure is moved to the open condition the actuator means moves the locking part to the locked position.

Preferably, the arrangement is such that as the closure is moved to the closed condition the actuator means moves the locking part to the locked position.

Preferably the method comprises automatically moving a locking part during the opening and the closing operation of the closure.

The method ensures that the closure is locked to the container following the opening and/or closing of the container.

According to a third aspect of the present invention, there is provided a closure for a container according to the first aspect of the invention.

According to a fourth aspect of the present invention, there is provided a locking part for a container according to the first aspect of the invention.

According to a fifth aspect of the present invention, there is provided a hollow body for a container according to the first aspect of the invention.

According to a sixth aspect of the present invention, there is provided actuator means for a container according to the first aspect of the invention.

According to a seventh aspect of the present invention there is provided a container according to the previous aspects of the invention and comprising a second containment region.

Preferably, the second containment region is disposed at the upper region of the body and is sealed by the closure of the container.

Preferred embodiments of the present invention will now be described in detail, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 is a perspective view of a first embodiment of a container in a closed condition and in a locked position;

Figure 2 is a perspective view of the container in Figure 1 when in the closed and unlocked position before the closure is opened;

Figure 3 is a perspective view of the container in Figure 1 with the closure opened;

Figure 4 is a top perspective view of the container in Figure 3;

Figure 5 is a side view in direction X of the container in Figure 2;

Figures 6, 7, 8 and 9 are left-hand side, right-hand side, top plan and bottom views respectively of the container in Figure 5;

Figure 10 shows slightly enlarged details of the ring in Figure 4;

Figure 11 shows another perspective of the details of the locking mechanism inside the ring in Figure 10;

Figure 12 is a perspective view of a second embodiment of the container in the closed and locked position;

Figures 13 and 14 are perspective views of the container in Figure 12 with the closure opened;

Figure 15 is a perspective view of a third embodiment of a container in the closed and unlocked position according to the present invention;

Figure 16 is a perspective view of the container in Figure 15 with the closure in an opened condition;

Figure 17 is a perspective view of the locking part of the container in Figure 15;

Figure 18 is a partial detailed view X of the locking part of the container in Figure 16;

Figure 19 is a partial detailed view Y of the closure and actuator of the container in Figure 16;

Figure 20 is a perspective view of a fourth embodiment of a container in the closed and unlocked position according to the present invention;

Figure 21 is a perspective view of the container in Figure 20 with the closure in an opened condition;

Figure 22 is a partial detailed view of the closure and actuator of the container in Figure 21; and

Figure 23 is a partial detailed view of the locking part of the container in Figure 21.

In Figures 1 to 11, the first embodiment of a container according to the present invention is depicted. The container comprises a hollow body 1 for holding solid or liquid contents and a closure 2, which closes the container. A locking part in the form of a locking ring 3 is provided between the body 1 and closure 2. The locking ring 3 is rotatable on the body 1. An indicator arrow A is located on the body 1 and an indicator arrow B is located on the closure 2. The locking ring 3 also carries an indicator arrow C and it is only when the indicator arrow C is aligned, by turning the locking ring 3, with the indicator arrows A and B (see Figure 2) that the closure 2 can be opened by lifting or flipping the projecting edge 4 of the closure 2. Clearly, an indicator arrow need only be provided on either the body 1 or the closure 2 but the user benefits from being able to align indicator arrow C on the locking ring 3 with either indicator arrow A or indicator arrow B.

The container also comprises actuator means in the form of an elongate member 6 that extends in a direction away from the inner surface of the closure 2. The member 6 comprises a hook shaped distal end 6a. Disposed between the distal end 6a and the closure 2 is a wedge shaped lug 10.

The locking ring 3 is located on the body 1 by way of a snap fit between circular rib formed on an annular shoulder (not shown) on the body 1 and a corresponding circular recess 12 formed adjacent the lower inner edge of the ring 3. The arrangement of the ring 3 and the body 1 is such that the ring 3 is secured to the body 1 but will rotate freely on the body 1.

In order that the closure 2 is locked onto the body 1, the locking ring 3 has a circumferential flange 8 on its inside surface. This flange 8 is formed with a recessed portion 9 through which the hook 6 and lug 10 can pass during opening and closing of the closure 2 if the arrows A, B, C are aligned. The lug 10 will sit under the flange 8 when the arrows are not aligned, thereby locking the closure 2 onto the body 1.

The locking ring 3 comprises a ramp 7 that is sloped from the axial direction of the ring 3 and extends from the inner surface of the ring 3. There is a gap 13 between the uppermost part of the ramp 7 and the flange 8 through which the lug 10 may pass when the arrows A, B, C are aligned. The ramp 7 comprises an upper inclined surface 14 and a lower inclined surface 16 (hidden in the Figures). The arrangement is such that if the arrows A, B, C are aligned and the closure 2 is opened the lug 10 passes through the opening 9 and the distal end 6a of the hook

6 will make contact with the lower inclined surface 16 of the ramp 7 and rotate the locking ring 3 i.e., back to the locked position. Also, the arrangement is such that if the arrows A, B, C are aligned and the closure 2 is closed the distal end 6a of the hook 6 will make contact with upper inclined surface 14 of the ramp 7 and rotate the locking ring 3 i.e., back to the locked position. In this respect, it should be noted that the locking ring 3 is freely rotatable on the body 1 once the hook 6 has travelled down the ramp 7.

In the embodiments shown the locking part is preferably in the form of a locking ring 3, however the locking part may be a non-annular shape for example a slideable element that is moveable by the actuator means in an arc or linear direction.

As an alternative, the ramp 7 could include a channel, which captures the tip of the hook 6 at the bottom of the ramp 7 whereby the hook 6 is only released when it has travelled to the top of the ramp 7. With this arrangement, the indicator arrow C is not aligned when the closure 2 has opened and the user can simply push the hook 6 over the flange 8 to close the closure 2.

The distal end 6a acts as an actuator that ensures that the respective arrow indicators are misaligned following the opening and/or closing of the container. The distal end 6a automatically moves the arrow indicators out of alignment during the opening operation and if necessary the closing operation. Therefore the child resistant feature is automatically activated during the opening operation and if necessary during the closing operation.

It should be noted that the hook 6 is flexible so that it is possible to push the closure 2 closed without aligning the hook 6 with the recessed portion 9. The lug 10 is sloped corresponding to the slope on the flange 8 so that it can simply be pushed over the flange 8 until the lug 10 slips beneath the flange 8 to lock the closure 2 onto the body 1.

The width of the recessed portion 9 is such that when the arrows A, B, C are aligned and the hook 6 sits at the bottom of the ramp 7, the lug 10 will be free to move out of the locking ring 3.

The body 1 in this embodiment has an annular opening 11 that is sealable by an annular rim 12 on the closure 2. This sealing arrangement helps prevent the ingress of water vapour, which could affect the stability of the contents and also acts to prevent leakage if the contents are liquid. The flange 8 and the annular opening 11 form a secondary containment volume 17. The volume 17 and the internal volume of the body 1 are separated from each other by an annular wall (not shown in the Figures). The volume 17 may be used to store material, such as part or whole pharmaceutical tables that have been removed from the container body 1. The containment volume 17 also provides an area that may be used to inspection the material that has been removed from the body.

In Figures 12, 13 and 14, a second embodiment of a container according to the present invention is depicted. The container comprises a tubular hollow body 20 holding solid or liquid contents and a closure 21, which closes the container. A locking ring 23 is provided

between the body 20 and closure 21 which can rotate between body 20 and closure 21. An indicator arrow D is located on body 20 and an indicator arrow E is located the locking ring 23. As with the first embodiment it is only when the indicator arrows are aligned, by turning the locking ring, that the closure 21 can be opened by lifting or flipping the projecting edge 24 of the closure 21.

In Figures 13 and 14, the closure 21 has been opened and the user is able to take out the contents. Since the closure 21 is hinged to the body 20 at point 25, there is no obstruction to emptying the contents as the closure 21 can sit right back as far as the hinge point 25 will allow.

The closure 21 is formed with an annular collar 25 extending around the perimeter of the closure 21. Extending from an inner surface of the closure 21 is an elongate member 26 formed with a frusto conical end 28 at the distal end thereof. A wedge shaped locking lug 38 is formed on an outer surface of the annular collar 25.

The locking ring 23 comprises an outer annular collar 31 and a radially inner annular track 32 formed with an inner annular channel and an upper annular slot 34. The inner annular channel is directly below the slot 34. The width of the slot 34 is less than the width of the annular channel. At one point on the slot 34 the width increases forming a circular access hole 36. The outer annular collar 31 is formed with a channel 37 that is sloped from the axial direction of the ring 23.

The locking ring 23 is located on the body 20 by way of a snap fit between a circular rib (not shown) formed on the body 20 and a corresponding circular recess (not shown) formed adjacent the lower inner edge of the ring 23 such that the ring 23 is secured to the body 20 but will rotate freely on the body.

The arrangement is such that if the arrows D and E are aligned the end 28 will be adjacent the hole 36 and the lug 38 will be at the lowermost end of the channel 37 and the closure 21 can be opened. As the closure 21 is opened the end 28 will pass through the hole 36 and the lug 38 will make contact with the upper inclined surface of the channel 37 and rotate the locking ring 23 i.e., back to the locked position. Also, the arrangement is such that if the arrows D and E are aligned and the closure 21 is closed the end 28 will pass through the hole 36 and then the lug 38 will make contact with lower inclined surface of the channel 37 and rotate the locking ring 23 i.e., back to the locked position. In this respect, it should be noted that the locking ring 23 is freely rotatable on the body 20 once the lug 38 has travelled down the channel 37.

The body 20 in this embodiment has an annular opening 40 formed in an upper wall 41. The opening 40 is sealable by an annular rim 42 on the closure 2. This sealing arrangement helps prevent the ingress of water vapour which cold affect the stability of the contents and also acts to prevent leakage if the contents are liquid. The upper wall 41 and annular track 32 form a secondary containment volume 43. The volume 43 may be used to store material, such as

part or whole pharmaceutical tables that have been removed from the container body 20. The containment volume 43 also provides an area that may be used to inspection the material that has been removed from the body.

The lug 38 acts as an actuator that ensures that the respective arrow indicators are misaligned following the opening and/or closing of the container. The lug 38 automatically moves the arrow indicators out of alignment during the opening operation and if necessary the closing operation. Therefore the child resistant feature is automatically activated during the opening operation and if necessary during the closing operation.

In Figures 15 to 19, a third embodiment of a container according to the present invention is depicted. The third embodiment comprises many common features as the first embodiment herein before described and the same reference numbers have been used to depict those common features.

The third embodiment container 50 comprises a hollow body 51 for holding solid or liquid contents and a closure 52, which closes the container. A locking part in the form of a locking ring 53 is provided between the body 51 and closure 52. The locking ring 53 is rotatable on the body 51. An indicator arrow B is located on the closure 52. The locking ring 53 also carries an indicator arrow C and it is only when the indicator arrow C is aligned, by turning the locking ring 53, with the indicator arrows B (see Figure 15) that the closure 52 can be opened by lifting or flipping the projecting edge 54 of the closure 52.

The container 51 also comprises actuator means in the form of an elongate member 6 that extends in a direction away from the inner surface of the closure 52. The member 6 comprises a hook shaped distal end 6a. Disposed between the distal end 6a and the closure 52 is a wedge shaped lug 10.

The locking ring 53 is located on the body 51 by way of a snap fit between circular rib formed on an annular shoulder (not shown) on the body 51 and a corresponding circular recess (not shown) formed adjacent the lower inner edge of the ring 53. The arrangement of the ring 53 and the body 51 is such that the ring 53 is secured to the body 51 but will rotate freely on the body 51.

The operation and function of the locking ring 53 and the actuator 6 is substantially the same as the description of the corresponding features of Figures 1 to 11 of the first aspect of the invention. It will be noted however that the locking ring 53 is disposed substantially about the central axis of the container 51. In this embodiment the container 51 is formed with an opening 55 located at one side of the container 51. The opening 55 provides access to the interior volume of the container 51.

A solid panel 63 seals a portion of the upper volume of the container 51. The panel 63 and an annular collar 61 form a second containment volume 64. A third containment volume 65 is formed by a portion of the panel 63, a portion of the radially outermost wall of the body 51

and actuate wall 67. The second and third containment volumes 64, 65 may be used to store solids of liquids. The second and third containment volumes 64, 65 may be used for storing pharmaceutical products such as pills or capsules and are particularly useful for storing partial pills or capsules. The containment volumes 64, 65 are sealed by the closure 52. The containment volumes 64, 65 also provide areas that may be used to inspection the material that has been removed from the body.

In Figures 20 to 23, a fourth embodiment of a container according to the present invention is depicted. The fourth embodiment comprises many common features as the first embodiment herein before described and the same reference numbers have been used to depict those common features.

The container 70 of the third embodiment differs from that of the first embodiment by the fact that the closure 72 of the container 70 extends across the uppermost end volume of the hollow body 1. The horizontal cross-section of the closure 72 is substantially the same as the horizontal cross-section of the body 1.

A solid panel 74 seals a portion of the upper volume of the container 1. The panel 74 and an upwardly extending collar 76 form a second containment volume 68. The second containment volume 68 may be used for storing pharmaceutical products such as pills or capsules and is particularly useful for storing partial pills or capsules. The containment volume 68 is sealed by the closure 72. The containment volume 68 also provides an area that may be used to inspection the material that has been removed from the body.